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(54) Appliance for printing on thin shelled objects using the pad printing process

Appliance for printing on raw or boiled eggs (11) in the shell using the pad printing process. Clamping cheeks for the eggs and at least 1 pad printing station (5, 5′) are provided for this. The clamping device has 2 diametrically opposed clamping cheeks, each of which is fitted with a pressure ring which can be placed on each polar area of the egg. To align the egg, the clamping cheeks (15, 16) can be slackened easily.

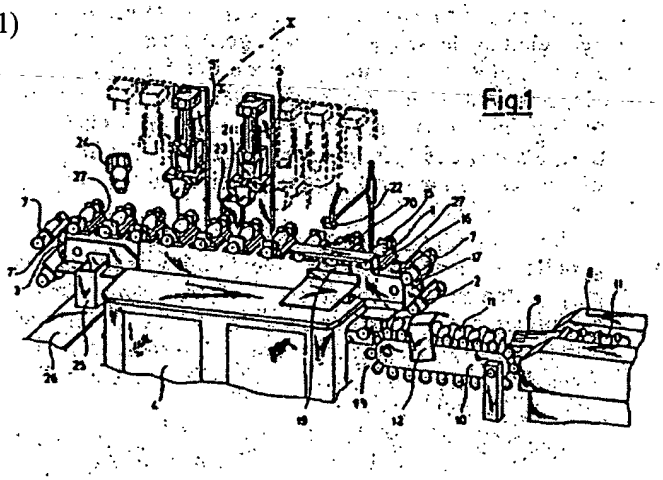

Fig.1

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Description

The invention concerns an appliance for printing on thin-shelled objects using the pad printing process with at least one clamping device for the objects and at least one pad printing station.

The printing of thin-shelled objects with one or multi-colored images using the pad printing process is known (literary evidence: print 3/1980).

In this respect, the pad printing process is especially suitable for printing onto delicate, or as the case may be, thin-walled objects.

When printing on raw or boiled eggs, the process is particularly difficult because the eggs are very delicate. Eggs, which people like to buy ready to eat at Easter time, have presented countless difficulties, which until now have rendered the printing on this kind of egg using the pad printing process uneconomical.

Thus the task arises of printing onto raw or boiled eggs in the shell, whereby especially the area, which lies around the equator of the egg, is suited for application of a relatively large area of print. The printing should also be multi-colored. Moreover, the appliance should offer the possibility of printing onto the front and reverse sides of the egg.

This task is basically solved by equipping the clamping devices for the pad printing process with two diametrically opposed clamping cheeks, each fitted with a pressure ring, which can be placed on the pole areas of the egg.

The egg thus lies between the described clamping cheeks in such a way that the complete peripheral area along the equator of the egg is clear. The printing is not carried out at some random point or another on the egg, as for example with egg stamping, but rather, a multi-colored print can be very precisely printed on a specific part of the egg.

Surprisingly, it has been found that by using these types of pressure rings, which clasp the pole area of the egg approximately 5 - 15 mm below the end points of the egg, considerable prevention of egg breakages, in spite of the print enabling clamping, results. The pressure rings are made of plastic, preferably from a rubber-elastic material.

To enable access to all sides of the egg, the clamping device with the clamped egg can be rotated. In order to be able to maintain the exact printing position, the clamping devices are so equipped that each one can be rotated through an angle of 360°/n (n=2, 3, 4, 6) in each case in a notch-indexed position.

A further part of the task is, of course, to compensate for the natural irregularity of the eggs. Contrary to accepted notions, no egg is the same as another. Eggs are natural products, which deviate naturally from each other, whereby deviations from rotational symmetry and small dents and bumps can be observed. It has thus been shown that the eggs, which are grasped by the open clamping cheeks, are not exactly aligned along their polar axis.

Thus there is the further part of the task, which is to bring the eggs, held in a clamping device, which are not exactly aligned, into exact alignment so that a faultless multi-color printing of the front and back sides is possible.

To this end it is suggested that one of the clamping devices can be lightly slackened, whereby the clamped egg can be twisted relative to the other clamping cheek. For this purpose

the pressure rings can be made from different materials. However, in general, the slight differences in friction between the one or other side suffice to allow the egg to be turned in a firmly held clamping cheek. At the same time it is also possible, with the help of the clamped slightly slackened egg contacting the alignment pad with which the egg by turning and moving on becomes centrally aligned, to jiggle the egg into the correct position. The alignment pad consists of a slightly concave, arched surface, which is covered with a rubber-elastic mass. By rolling along the alignment pad, which is preferably positioned above the direction of travel of the egg, an aligned position is set up between the clamping device pressure rings by rolling and pressing the egg.

The slightly slackened clamping position is triggered with the aid of a pulling device, which engages the clamping cheek. The pulling device thereby can be primarily a fixed slide gate along which parts of the clamping cheek slide so that this clamping cheek is pulled slightly outward in relation to the other one, making it such that the clamping position is slackened.

The above-described clamping device, which is fundamental to the invention, can be manually operated as single units and thus be brought into a position for printing; however it is preferable to use an arrangement in which several clamping devices are mounted. For smaller production runs, for example, carousel arrangements are suitable whereby the carousel is provided with at least one egg feeding device and at least one pad printing station.

To enable the processing of larger numbers, several clamping devices are mounted on a linear conveyor, which runs through several stations in a row, whereby an egg-feeding device is positioned at the start of the conveyor path, and one, but preferably up to eight-pad printing stations, are provided along the conveyor flow path.

It has been shown that the breakage rate can thus be kept very low. Despite this, breakages caused by printing and clamping always occur. These eggs are understandably no longer sellable. For this reason a sensor, which detects the presence or absence of a broken egg, is provided in the path from the clamping device to the egg feeding device and first pad printing station. This latter works in that the distance from the surface of the egg deviates considerably from the pre-set norm.

With the aid of a control switch, the broken egg can be skipped by the printer. It is then removed manually or with the help of a picker. It is further foreseen that a bowl, carried along with the clamping device, be provided underneath each clamping device, which removes the broken eggs, so that the functioning of the conveyor and the pressure device is not disturbed.

Further sub-claims are elucidated in the description.

Design forms of the invention are elucidated in the accompanying description by means of the drawing. The drawing figures show:

Fig.1 a device for printing on eggs in an initial design form, equipped with a chain line conveyor;

Fig. 2 a section through the device's printing station in accordance with Fig. 1;

Fig. 3 schematic drawing of a printing arrangement in which the clamping devices are mounted on a carousel;

Fig. 4 shows a clamping device in detail.

The device shown in Fig. 1 works according to the pad printing process. A chain conveyor 1 is guided in an upper strand and a lower strand and has for this purpose at the start at 2 and at the end at 3 specific return wheels of which the rear one is driven. The lower strand is led inside a machine cover in the base 4, while the upper strand is lead under several printing stations 5, 5′. The individual components of the chain conveyor 1 consist of the clamping

devices 7, which are set on the base plates 7′ which are still to be elucidated.

The eggs are conveyed with the aid of a known belt feeder 8 and arrive over a short rolling surface 9 onto an intermediate conveyor belt 10. On the intermediate conveyor belt, which is made up of individual double cone defined cavities, the eggs 11 are aligned with the aid of a guide 12 and arrive at the pickup station 14. Here, they are laid in between the two clamping cheeks 15, 16 which have been pulled apart, this operation being explained in more detail below. The clamping cheeks 15, 16 are next pulled apart from each other. After leaving the pick-up station the clamping cheeks are brought together so that each individual egg in the clamping device is held by each of its pole areas. The clamped eggs are conveyed upward, where they arrive at the upper strand of the chain conveyor 1.

The clamping devices can each be twisted while clamping an egg. The clamping cheek 16 is moreover fitted with a protruding shaft and toothed wheel 17 at the front of the clamping device, and also with a further possibility for a rotating device diametrically opposed to the toothed wheel.

The eggs are aligned inside the clamping device in the aligning station, which will be further elucidated. Eventually the eggs arrive, their area around the equator exposed, under the first printing station 5. A further three printing stations, which are not illustrated here, follow on from the first printing step. A pad stamp 21 is provided here which is fitted conventionally with a print image and which sinks subsequently onto the egg and transfers this print image on to the egg shell. A proximity sensor 22 is fitted in front of the first printing station, which determines whether there is an egg in the clamping device or if it is broken. In the case of a fault being signaled in this way, the printing station is activated by means of a control device so that it lets the clamping device with the missing or damaged egg pass without the printing operation.

The further pad printing stations print the egg with each of several print colors so that a very exact multi-color print results.

In the turning station 23 the clamping device together with the egg is rotated through 180°, so that the other, still blank side of the egg can be printed. A further printing station 5′ is provided here whereby with the soft stamping pad 21 specific printing is carried out. For four-color printing, three further printing stations are provided which, however, are not illustrated here.

After traveling through the pad printing stations 5, 5′, the eggs, with the aid of a fan, are dried so that the print color can no longer be smudged. From here the clamping devices arrive at the end of the conveyor 1. At the beginning of its lower strand, a slackening device 25 is provided. One of the clamping cheeks is pulled away from the other. The printed egg falls out of the clamping device and travels through a conveying trough 26 to a packing station (not illustrated).

Underneath each clamping device 7 a cup 27 (similar to Fig 4) is located into which the broken eggs fall during the printing operation, so that before passing through the loosening device 25, they can fall out and be caught in the scrap container (not illustrated).

Printing of the eggs is carried out with legally permitted food coloring and solvents. A very precise multi-color print is possible.

Fig.2 shows a section through the device according to Fig. 1 along the line I__I. A printing station 5 is schematically illustrated. The stamping pad 21 provides the print image with the aid of a reciprocating wiper device.

A clamping device 7 lies underneath the stamping pad 21 at any one time. This has two

clamping cheeks 15, 16 which, with the aid of one or two springs 30 are pushed together, so that the egg 11 is clamped. A bowl 27 is located underneath the egg. The clamping device 15 continues forward by means of the holding plate 31 and carries the toothed wheel 17 on its axis. An engaging wheel 32 is provided diametrically opposite.

In the lower conveyor strand, it is shown that both clamping cheeks 15, 16 can be pulled away from each other against the force of the spring 30, so that the egg simply falls out and is taken away by the removal conveyor.

In fig. 3 a printing arrangement is illustrated in which several clamping devices 7 are mounted on a carousel device 34. The carousel device 34 consists of a central circular plate 34′ which is driven by a drive mounted underneath the plate whereby the driving takes place step-wise and if necessary can be controlled by a pedal device. The eggs 11 are clamped manually in a pick-up station 36 whereby, by slightly slackening and turning the one clamping cheek, the eggs inside the clamping device can be aligned.

By turning the plate 34′ in a clockwise direction, the egg 11 arrives at the first printing station 37 and so on in stages to further printing stations 38, 39 40, whereby here conventional pad printing machines are concerned. Between each of the stations, fans 41 are provided for drying the printing ink. Between the pick-up station and the last printing station, a turning station 42 is provided, which rotates the eggs each through an angle of 180°. It is however also possible to select another angle of 360°/n; (n=3, 4 or 6), for example if symmetrical Easter eggs are selected.

The turning station is equipped with a stepped switching motor 43 which is connected to the one clamping cheek of the clamping device. A further outwardly protruding wheel 44 which is connected with the other clamping cheek, serves to tighten, slacken and align the egg in the clamping device.

A clamping device 7, as used in the arrangements in Figs. 1 to 3, is shown in Fig. 4.

On the holding plate 7′, two upright plates 31 and 45 are fixed which hold the bowl 27. The plates 31 and 45 are equipped with bearings 46 and 47 which are inserted with a shaft 48 or 49 respectively, which is held and can be twisted in them. The shafts 48 and 49 are each connected to a clamping cheek 15 or 16 respectively.

The clamping cheek 15 consists of a flanged ring 50 positioned on the shaft 48 such that a holding cup 51 is so positioned that it overlaps a part of the flanged ring 50. In the cavity between the holding cup 51 and the flanged ring 50, a spring is provided. The holding cup has a frontal opening 53 which is padded with a pressure ring 54 in its forward area. The opening 53 and the pressure ring 54 are dimensioned such that they press onto the eggshell about 5 – 15 mm below the egg polar cap 55, 55′. Diametrically opposite, the clamping cheek 16 is equipped in a similar way. A clamping cup 58 likewise has a pressure ring 57. The egg 11 is clamped between the pressure rings 54 and 57, as illustrated in the drawing.

The shaft 48 continues up to the toothed wheel 17 which is securely flanged on. In the area of the aligning station 19, a toothed rack 60 is located which meshes with the toothed wheel 17 and thereby twists the shaft 48 with the holding cup 51 when this turns on the toothed rack 60. To slacken the clamped egg, a pulling device is necessary which acts on the clamping cheek 15. In the case in hand, a slide gate 61 is engaged by the toothed wheel while it advances, being mounted in the area of the aligning station 19 underneath the toothed wheel 17 and tangential to its flank 62, and by means of its curvature the wheel is jerked outward, as is recognizable by the broken line illustration. By this means, the spring loading on the pressure ring 54 is slightly slackened. The egg twists somewhat within its clamped position

against the other pressure ring and finishes up in the exact alignment from polar cap 55 to polar cap 55'. Squint positioning is thus avoided and an exact printed image made possible. Additionally, another egg clamping aligning cheek can be provided (illustrated with a broken line in Fig. 1).

A similar alignment is also possible with the manually operated feeding station in the carousel arrangement according to Fig. 3. Here the clamping cheek 15 is pulled out by hand and the egg is subsequently aligned by lightly hand-rolling it.

On the right hand side of the drawing, the engaging wheel 32 can be recognized, which is provided with two opposing recesses 63 and 64. In these recesses, the pins 65, 66 of the driving wheel 67 of a stepping switch motor (not shown) can be engaged thus rotating the clamping device precisely with the clamping cheeks 15, 16 each on the egg axis through an angle of 180°, or if necessary through another angle, so that the front and reverse side of the egg 11 can be printed.

Patent claims

1. An appliance for printing on thin shelled objects using the pad printing process with at least one clamping device for the objects and at least one pad printing station is thus identified in that for printing raw or boiled eggs (11) in the shell, the clamping device (7) has two diametrically opposed clamping cheeks (15, 16) which are each equipped with a pressure ring (54, 57), which can be positioned on each pole area of the egg.
2. Appliance according to claim 1 is thus identified in that the pressure rings (54, 57) consist of rubber elastic material.
3. Appliance according to claim 1 or 2 is thus identified in that the clamping device (7) with a clamped egg (11) can be twisted around the axis of the egg.
4. Appliance according to claim 3, is thus identified in that the clamping device (7) can be turned through an angle of 360°/n (n = 2, 3 ,4 ,6) in each case in an notch-indexed position.
5. Appliance according to claims 1 to 4 is thus identified in that one of the clamping cheeks (16, 15) in a slightly slackened clamping position with a clamped egg (11) can be twisted in opposition to the other clamping cheek (16, 15).
6. Appliance according to claim 5 is thus identified in that the slightly slackened clamping position can be created with the aid of a pulling device (61, 62) which engages the clamping cheek.
7. Appliance according to claim 6 is thus identified in that the pulling device is a (61) which is engaged by parts (62) of the clamping cheeks while advancing.
8. Appliance according to one of the above claims thus identified in that several of the clamping devices (7) are mounted on a carousel device (34), whereby at least one of the egg pick-up stations (36) and at least one pressure pad printing station (37-40) is assigned.
9. Appliance according to one of the above claims thus identified in that several of the clamping devices are provided at a line conveyor (1), which travels through several stations one after the other, whereby at the start of the conveyor path an egg feeding device (8) and along the length of the conveyor, at least one pressure pad printing station (5, 6) are arranged.

10. Appliance according to one of the above claims thus identified in that in the area where the clamping device will travel through after the feeding device, a sensor (26) is arranged, which senses the presence or absence of a broken egg in the clamping device.
11. Appliance according to one of the above claims thus identified in that beneath each clamping device, a basin is (27) is arranged which travels together with the clamping device.

In addition 4 page(s) of drawings

DESIGN PAGE 1

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Fig.1

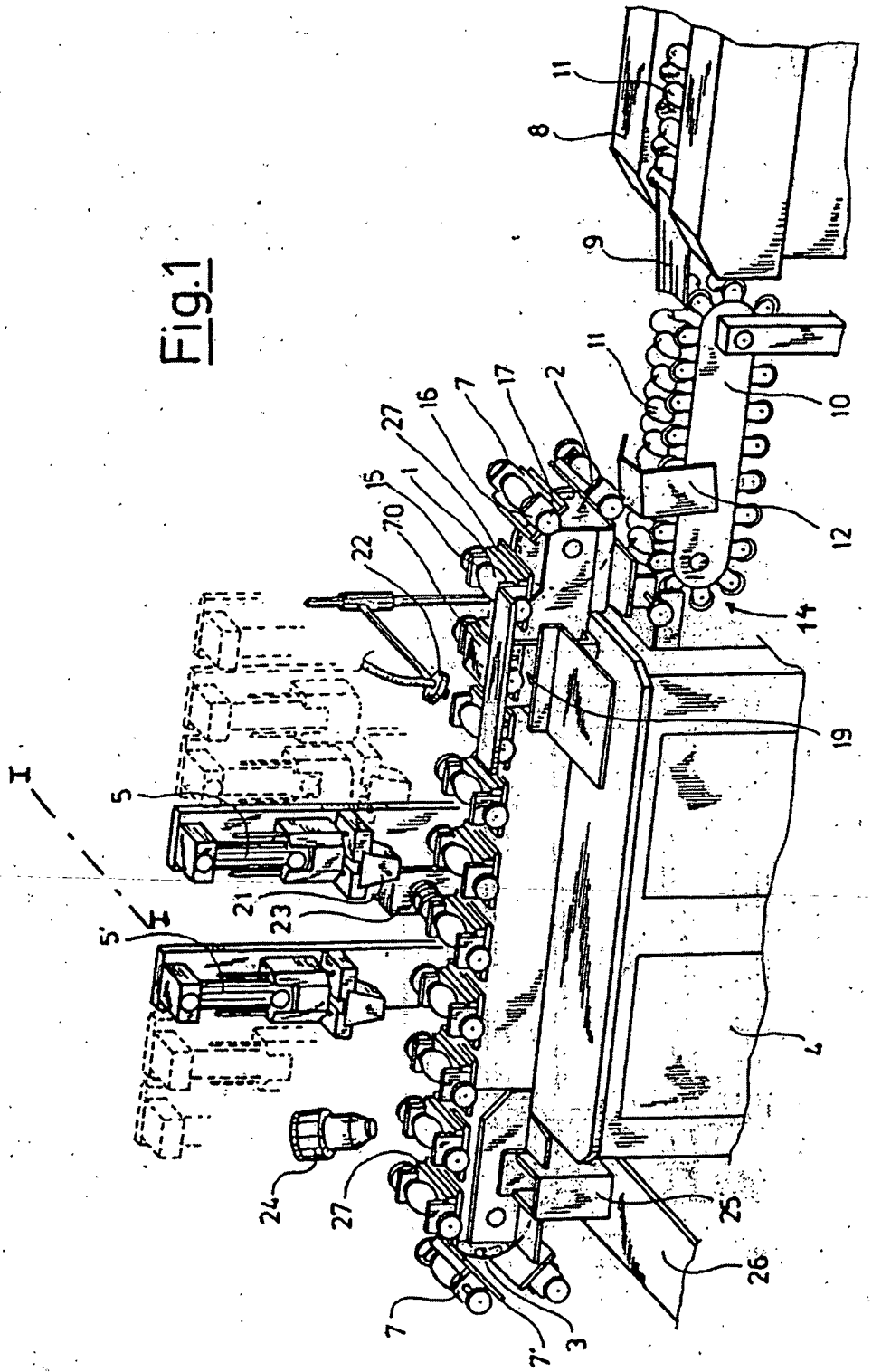

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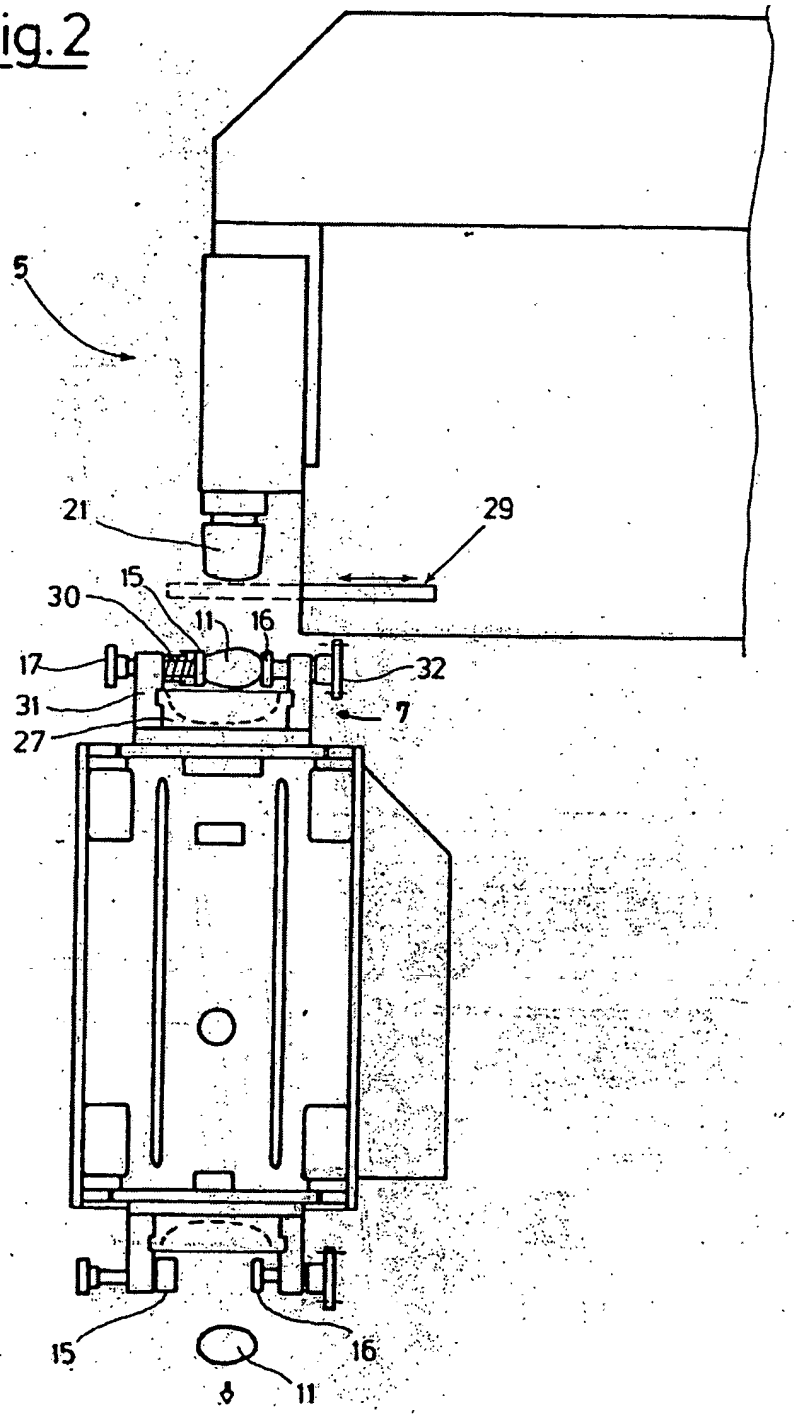
Fig. 2



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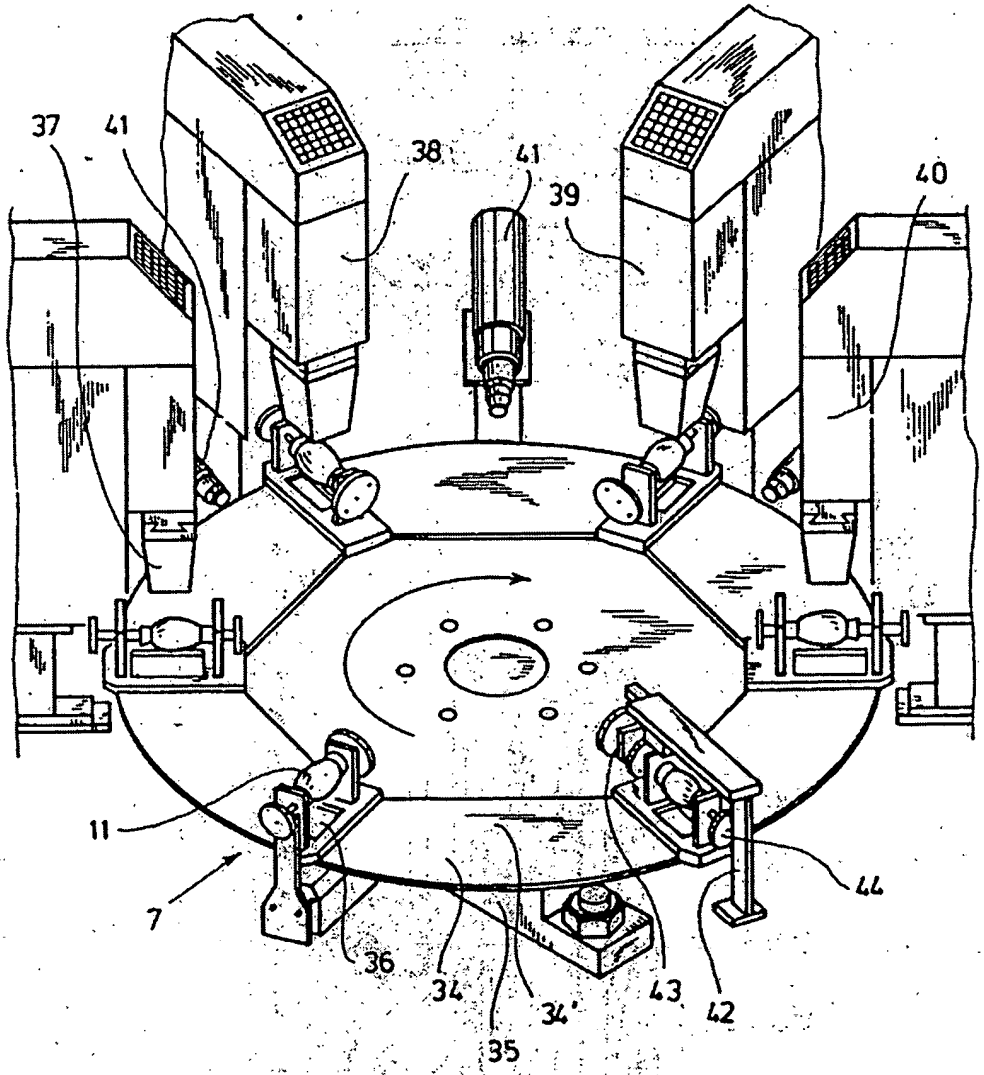

Fig.3

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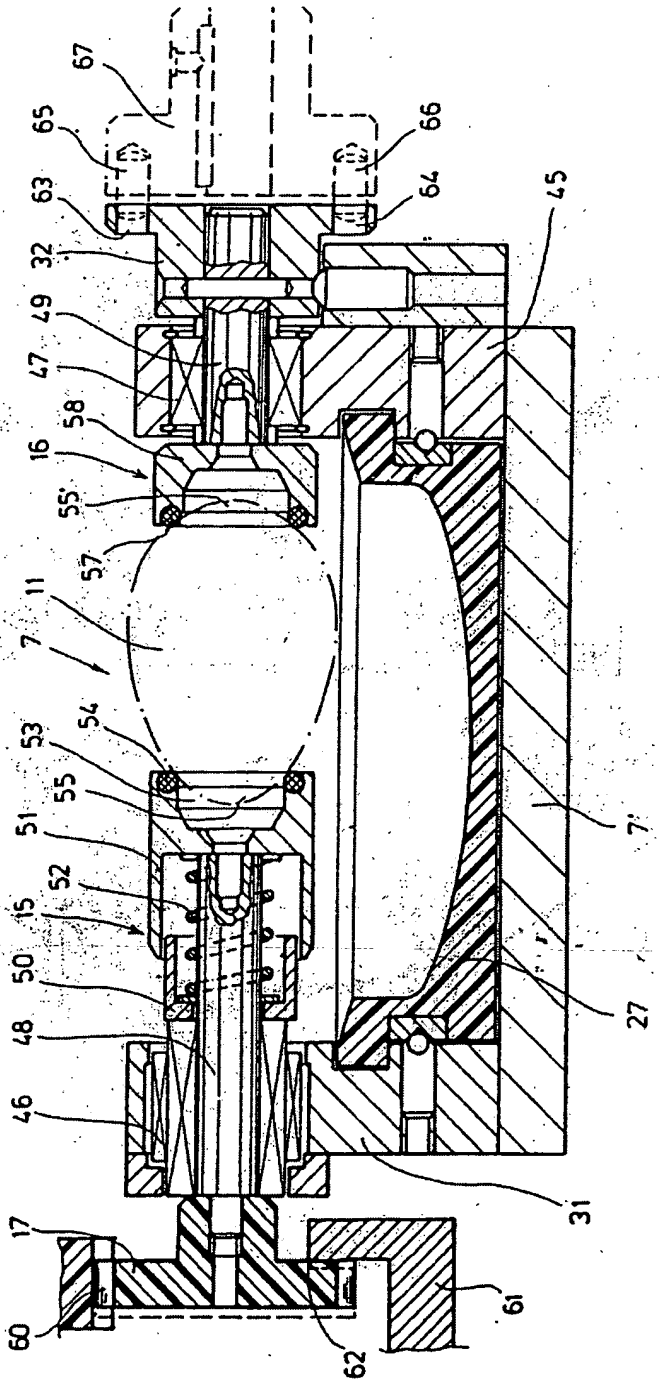

Fig.4

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